

Game Sound: Working Practices, Technologies, Challenges and Emerging Opportunities

SAMIS Conference, July 2022



Introduction

- Who are we? Dr. Michael Cryne and Dr. Darrell Gibson from Bournemouth University – we're in the department of Creative Technology



Areas of discussion

1. The current state of play (excuse the pun) in Game Audio and Music
2. The Technologies involved in game audio and music that are facilitating and enabling these developments.
3. Some of the challenges involved, from creative silos through to the problems inherent in asset creation and workflows etc.
4. Future opportunities and developments.



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Non-linearity

- Unlike traditional linear media the narrative can and should be affected by the player interactions to provide a more compelling experience. This means that potentially the plot, music, sound effects, atmospheres and dialogue may all be affected by player choices and gameplay. This being the case they should be created and developed together.
- One of the central questions we're concerned with is not just how the end result is produced (with sound, music and game blended well) but how the process itself is happening. What's actually happening in the various game studios? What's the process of how the two (or three) things come together?
- There are obviously many variations in the way that sound and music become integrated into a game, but how do these things vary from studio to studio, and from indie through to AAA.
- We think that the nature of the medium gives rise to some interesting research questions, about how sound is made, through to how it's integrated, through to how music is composed for games ('adaptive' music), and we're hoping to present/introduce some of the people and communities that are investigating this area.



Directions of travel – indie vs AAA

The development of AAA projects is sometimes documented, although much more work needs to be done to ascertain exactly how a huge project comes together in terms of workflow, this might include (although it is not limited to):

Dialogue production

SFX production

Music Production

Post-production (mixing etc)

Workflow tends to be better documented as well, with larger studios using fairly standard corporate scheduling, budgeting and project organizational systems (Scrum, Agile etc)

Roles are fairly clearly-defined, with distinctions being made between creative/technical sound designers, senior sound designers, specialists in implementation, dialogue leads/supervisors, localization specialists etc etc.** (I've linked to job descriptions from Soundlister).

A word on (unsustainable?) budgets*. According to Shawn Layden, the average budget for a AAA game is between \$80million and \$150 million on average.



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Indie working practices

Our findings show that 1) indie game development teams are formed upon shared aspirations and use various strategies to collaborate with friends or online strangers; and their team practices are achieved through a balance between individual creativity and collective vision as well as a collaborative learning for problem solving and self-improvement; and 2) these teams mediate new forms of social interaction and collaborative experiences, featuring a mix of online comradery and weak social ties, and a mix of self-confidence and self-confliction* (Freeman, G. and McNeese, N., 2019)



Game Audio and music practices in indie:

1. Very loosely defined roles
2. Remote working the norm (often spanning every available time-zone)
3. Blurring of lines between sound designer and composer (often done by the same person)
4. Implementation/integration is also usually handled by this person or persons

Blurring the lines between sound and music

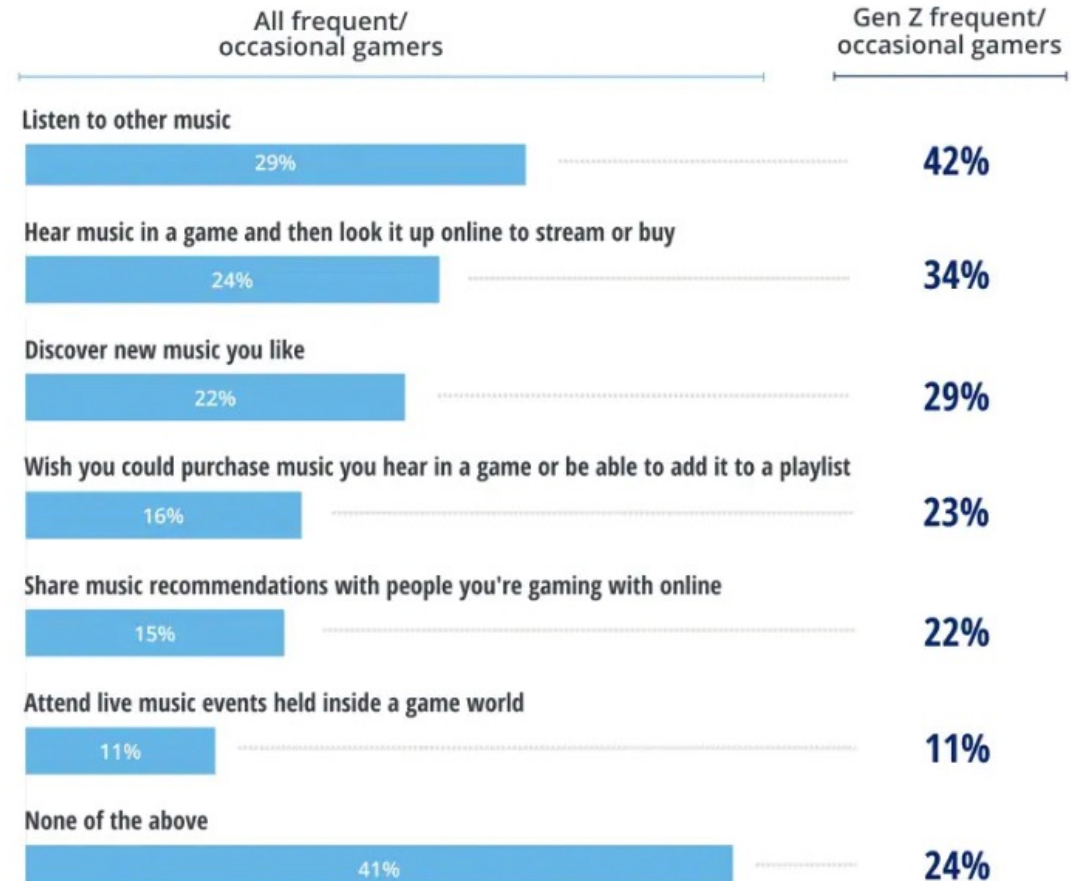
Often, music, sound effects and dialogue together accompany and impact a player's experience playing a video game, and as Karen Collins points out, 'theorizing about a single auditory aspect without including the others would be to miss out on an important element of this experience, particularly since there is often considerable overlap between them'. (The Cambridge Companion to Video Game Music , pp. 176 – 192)

There's a parallel here between the worlds of film and game. Samuel J. Chase coined the term 'filminimalism' to discuss the scores of Johann Johannsson, Hildur Guðnadóttir, Trent Reznor and Atticus Ross, and Mica Levi.

This tends to be mirrored in survival horror games (Outlast, Dead Space, Alien Isolation, Soma) and I'm currently looking for examples outside this genre that blur this line in a similar way.

For younger gamers, music is a big part of the experience

While playing games, do you do any of the following? (Select all that apply.)



Note: N (frequent/occasional gamers) = 792.

Source: Digital media trends, 15th edition (Fall pulse survey, October 2021).

Technologies



The role of new technologies in game audio and how it is affecting game audio and music:

1. Game Engines and Middleware
2. VR
3. AI and procedural audio
4. Game music developments
5. A developing research culture

Game Engines – The basic level of implementation

- Unity
- Unreal Engine
- Godot
- Gamemaker
- AppGameKit
- CryEngine



Basic Tools provided by a game engine

Most of the leading game engines offer the following sound design possibilities:

Procedural (getting the maximum variation from the minimum amount of recorded audio – changing the sequence of the sounds, using randomisation, layering and modulating sounds).

Spatial (having sounds exist in spaces and creating living, breathing ambiances).

Dynamic sound design (audio that reacts and changes with the game state in real time).

There's a wonderful (10 minute) introduction to the basic possibilities offered by game engines here:

<https://www.youtube.com/watch?v=k7loBF-mOPg&t=36s>

There's also a very thorough course offered by Richard Stevens and Dave Raybould, who wrote the (now famous) 'The Game Audio Tutorial'*

<https://dev.epicgames.com/community/learning/courses/qR/ambient-and-procedural-sound-design/2bv/unreal-engine-introduction-to-the-course>



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The rise and rise of middleware

1. Middleware is a kind of 'bridge' between the game engine and the game's music and sound effects. Wwise and FMOD are the two most commonly used.
2. Tools for adaptive music*
3. More sophisticated tools for repetition and variation, as well as more sophisticated layering.
4. Audio manipulation is possible (EQ, compression, reverb etc) and these things can also react to game states.
5. Localisation is also easier, as well as creating different audio versions for different platforms (PC, Mac, Tablet, Phone etc.)



Music

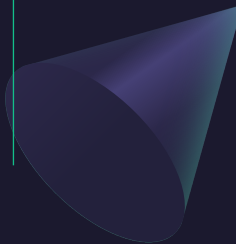
Middleware has opened up many creative possibilities

Types of compositional strategies have evolved that take advantage of the possibilities available in the software.

Elizabeth Medina-Gray (for example) has coined the term 'modularity', in which 'blocks' of music can be shuffled and re-arranged. Composer Winifred Phillips has presented several papers recently on how she composes deliberately using this modular approach.*

Both middlewares offer many compositional possibilities which are too numerous to list, but I'm personally fascinated (as a composer) about the relationship between middleware and composition – how the possibilities available in middleware affect the composer from the outset, and how composers are affecting/extending the possibilities of middleware.

- Implementation of dynamic music (list from Dr. Tim Summers of the Ludomusicology research group)
- Middleware: FMOD and Wwise
 - Typically based on loops and layers
- Generative music
 - Challenges of interest and musicality
- Tension of interactivity – ahead/behind game action
 - More unusual processes where musical structures can inform gameplay (possible with iMUSE engine amongst others)
- Different types/modes of synchronization (Donnelly, 2021)
 - Precise synchronization, plesiochrony, music-led asynchrony, parallel-path asynchrony



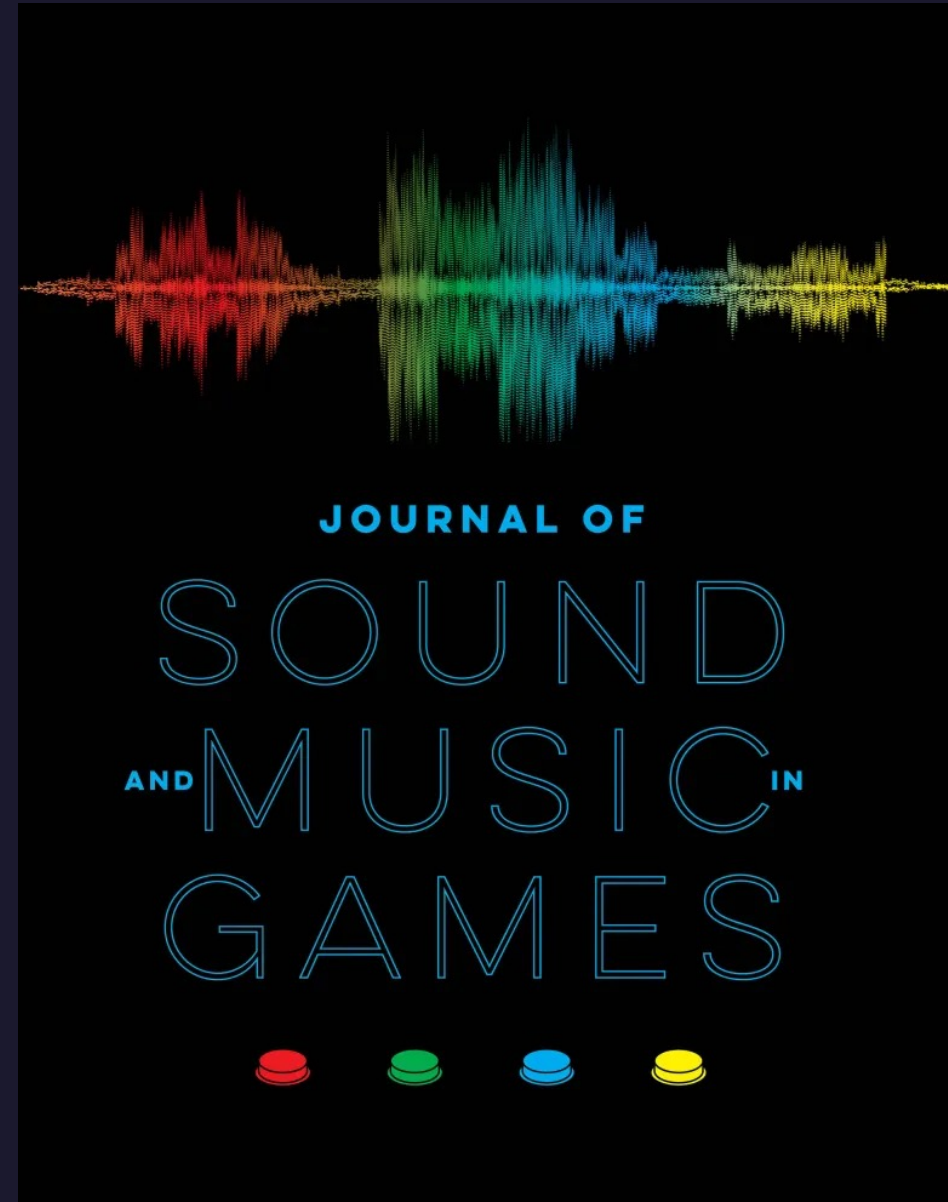
Society for the Study of Sound and Music in Games

The [Journal of Sound and Music in Games \(JSMG\)](https://www.sssmg.org/wp/jsmg/) is a peer-reviewed journal that presents high-quality research concerning all areas of music and/or sound in games. It serves a diverse community of readers and authors, encompassing industry practitioners alongside scholars from disciplinary perspectives including anthropology, computer science, media/game studies, philosophy, psychology and sociology, as well as musicology. *JSMG* is the only journal exclusively dedicated to this subject and provides a meeting point for professionals and academics from any tradition to advance knowledge of music and sound in this important medium.

Though *JSMG* primarily focuses on video games, the journal welcomes studies of music and/or sound in any form of game (for example, sports, historical games predating video games, and so on). *JSMG* publishes original research articles, supplemented by a range of other content including review articles surveying important subjects, reviews of pertinent books and games, communications with responses, and interviews. The journal will also occasionally present topically themed special issues and conference proceedings.

As the journal of the Society for the Study of Sound and Music in Games, *JSMG* acts as a lively forum for the presentation and dissemination of knowledge, uniting theory and practice in this domain of musical-sonic activity.

<https://www.sssmg.org/wp/jsmg/>

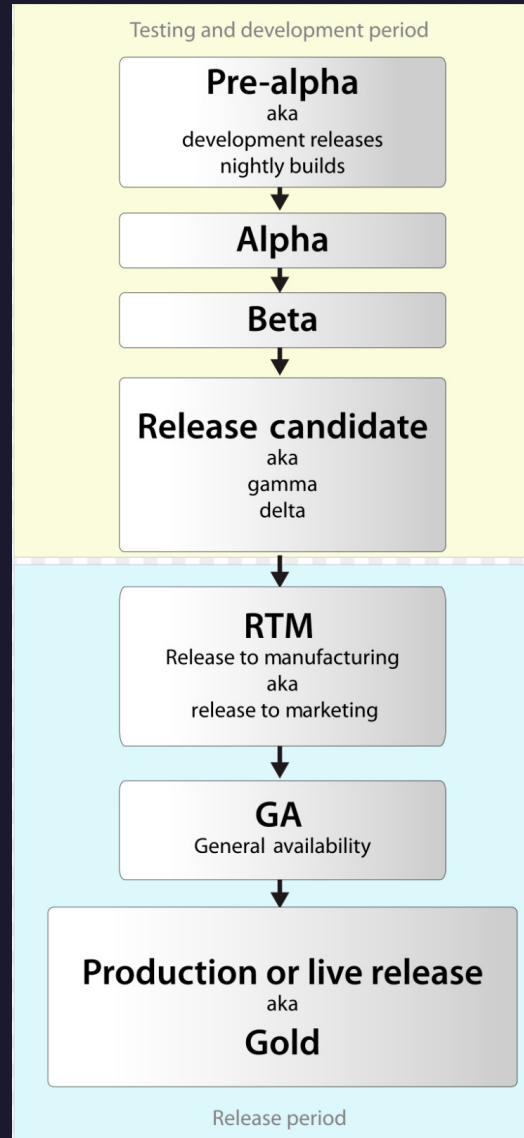


Game Development Pipeline

- Like other media, game development goes through three stages:
 - Pre-production – define what the game is trying to achieve and who is it for
 - Game Design Document (GDD)
 - Concept art
 - Prototypes
 - Production – where the actual game is built
 - Gameplay defined and developed
 - Programming
 - Assets created (characters, creatures, props, environments, levels, etc.)
 - Integration
 - Testing
 - Post-production
 - Shipping
 - Maintenance (fixing bugs, creating patches, etc.)
 - Additional downloadable content (DLC)
 - Achieving



Game Production Workflow



Creative Silos

- As with other creative content creation, the games industry tends to use a team-based approach
 - Designers, artists, level-designers, programmers, audio, testing, etc.
- Team sizes vary based on the scale of a particular production
- A silo mentality can result in tunnel vision, tribalism and limited sharing of information
 - Not necessarily on purpose
- Problems can be minimized through taking a collaborative approach
 - Particularly through the "ideas" stages of early development
- In game production the sound team becomes involved much earlier in the production than for linear media



Asset Creation


- Process of creating assets for a game
- A game asset is any piece of content that goes into a game
 - Character, sounds, animations, textures, or objects
- Generally undertaken using third party or proprietary tools
- Requires in an iterative process resulting in a lot of backwards and forwarding between the game designers and asset creators
- Asset recycling is when creators reuse assets created for a previous game development
 - Needs to be used sparingly
- Some assets will require development by multiple teams
 - Early and clear communication channels are vital



Music & Sound Assets Creation Challenges

- Composers and sound designers generally use a DAW asset creation
 - Difficult to test interactivity without game engine integration
 - Exploring different compositional strategies can be difficult
 - Middleware helps, but assets are "drafted" before
- Same is true for procedurally generated sounds
- Given the interactive nature of games, building cohesive soundworlds can be difficult
 - This makes it particularly hard to enhance the narrative
- Sound and music assets should be developed in conjunction with visual assets so the two have the opportunity to inform each other
- Narrative development based on asset creation can be difficult to achieve

Future Opportunities

- AI-Based sound (dialog, music and FX)
 - Middleware/DAW Based Integration
 - Interpolated procedural audio for providing parameterization
 - Sonic interaction design for multi-user VR/AR environments
 - Feed outcomes of asset creation into narrative development
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- Particularly when assets require visual and sonic components



Conclusions

1. Game audio (and music) is becoming a serious field of academic study, with various journals and research groups involved
2. The technologies that are involved represent a particularly interesting field of study for those of us working in practice-based research
3. Challenges exist developing multifaceted assets and in particular linking these to the forming of the narrative
4. Emerging technologies may hold the key to much tighter asset creation allowing earlier development and the opportunity to further influence the narrative



Some final thoughts

Rachel Andrew, Montreal Girl Geeks

Questions?

